Dylan Mumm
020

1. The Excel Phone Company sells cellular phones and phone plans in several southeastern states. At a recent meeting its marketing manager stated that the average age of its customers is under 40. This was mentioned in conjunction to a proposed marketing plan directed at a young audience. Before completing the marketing plan, the manager decided to conduct a survey of 50 randomly selected customers to determine the age demographic as well as several other variables. The company plans to focus their marketing efforts based upon the results of the survey. The results of the survey are contained in the file called Age Survey. A. (1 pt) Using the information in the file, compute a point estimate of the true
    a. (1 pt) Using the information in the file, compute a point estimate of the true mean age of the customers at the Excel Phone Company.
        i. 38.52 years
    b. (1 pt) State and check the conditions for estimating the true mean age of the company's customers.
        i. Randomly sampled (stated)
        ii. Distribution is approximately normal (derived from sample of 50)
    c. (2 pts) Using the Excel worksheets, compute a 90% confidence interval for the true mean age of the company's customers. Provide a screenshot of the Excel worksheet.

Checking Conditions	Enter Yes or No
Stated in problem?	yes
Population X approximately normal?	no
Sample Size ≥ 30?	yes

Input Values	Enter
Sample Mean (x-bar):	38.52
Sample Standard Deviation (s):	12.99645
Sample Size (n):	50
Confidence Level (in decimal form 95% = 0.95):	0.9

Results (Do Not Change These Values)	
Critical Value [t(alpha/2)]:	1.676551
Standard Error[s/sqrt(n)]:	1.837976
Margin of Error [critical value*standard error]:	3.08146
degrees of freedom	49

Lower Bound:	Upper Bound:
35.43854039	41.60145961

    d. (1 pt) Interpret the interval that you found in part C.
        i. We are 90% confident that the true mean is greater than 35.439 and lower than 41.601
    e. (1 pt) Based upon the confidence interval that you computed, what can you say about the marketing manager's statement about the average age of the company's customers?
        i. We cannot reject it

2. Success, a recently released magazine targeted to young professionals claims that 65% of its subscribers have an annual income greater than $120,000. The sales staff at Success uses this high proportion of subscribers earning more than $120,000 as a selling point when selling advertising. Success is currently trying to sell a large amount of advertising to a company that sells expensive wines. The wine company's market research division decides to conduct a survey of 196 of Success subscribers to verify the claim that 65% of its subscribers earn more than $120,000 annually. The file Success contains the results of the survey. The responses are coded "Yes" is the subscriber earns more than $120,000 annually and "No" if the subscriber does not earn more than $120,000 annually. Is there evidence to support the magazine company's claim at the 5% level.
    a. (1 pt) State appropriate hypotheses.
        P = true proportion of subscribers with annual income greater than $120,000
        H_o: p = .65
        H_a: p != .65
    b. (1 pt) State and verify the conditions for this test of significance.
        i. Randomly sampled, not explicitly stated, but will be assumed
        ii. Sampling distribution is approximately normal as np > 5 and n(1-p) > 5
    c. (2 pts) Using Minitab or Excel, perform the appropriate test of significance. Provide Minitab or Excel output.

Input Values	Enter	
Hypothesized Population Proportion (p_0)	0.65	<-- *Enter Value*
Number of Trials in the sample (x):	131	<-- *Enter Value*
Sample Size (n):	196	<-- *Enter Value*
Significance Level (in decimal form 5% = 0.05):	0.05	<-- *Enter Value*

Results (Do Not Change These Values)		p-values		
Standard Error[sqrt(p(1-p)/n]:	0.034069			
Test Statistic (Z)	0.539118	HA: $p < p_0$	HA: $p > p_0$	HA: $p \neq p_0$
Sample p (p-hat)	0.668367	0.705097253	0.294902747	0.589805494
		Do Not Reject H0	Do Not Reject H0	Do Not Reject H0

    d. (2 pts) Based upon this test of significance, what can the wine company conclude about the subscribers of this magazine?
        i. That they do not reject their initial claim
    e. (1 pt) Describe Type 1 error in this situation and give a possible consequence of this error.
        i. If they rejected H_o despite it being true – they would have thought their initial advertisements were false despite them not, and might have pulled the ads
    f. (1 pt) Describe Type 2 error in this situation and given a possible consequence of this error
        i. If they failed to reject H_o despite it being false – they would have thought their initial claim was true, and might continue to advertise with it, despite it being false

3. At the annual meeting of the well-known golf manufacturer, a speaker made the claim that at least 30% of golf clubs being used by nonprofessional members of the United States Golf Association (USGA) are “knock-offs”. These knock-offs are clubs that look very much like the more expensive originals but are sold at a very reduced price. As a result of the speaker’s comments, the USGA decided to conduct a poll of 294 randomly selected members and the results of the survey may be found in the file Golf Survey.
    a. (1 pt) Using the information in the file, compute a point estimate of the true proportion of nonprofessional golfers who use “knock-off” golf clubs.
        i. P-hat = .26
    b. (1 pt) State and verify the conditions for estimating the true proportion of nonprofessional golfers who use “knock-off” golf clubs
        i. Randomly sampled, stated
        ii. Distribution approximately normal, n(p-hat) and n(1 – p-hat) both > 5
    c. (2 pts) Using Minitab or Excel, compute a 95% confidence interval for the true proportion of golfers who use “knock-off” golf clubs.
    d.

Lower Bound:	Upper Bound:
0.218036437	0.319378529

    e. (1 pt) Interpret the interval that you computed in part B
        i. We are 90% confident that the true proportion is greater than .2180 and lower than .3194
    f. (1 pt) Based upon the confidence interval, what can you conclude about the golf manufacturer’s claim?
        i. We do not reject their claim